



IDAHO DEPARTMENT OF  
**HEALTH & WELFARE**

**Bureau of Community and Environmental Health**

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**Past Lead Exposure and Health:  
General Information for Health Care Providers**

Lead serves no useful purpose in the body and is toxic to many body organs and systems. Current, ongoing exposure is known to have many harmful effects on human health. Moreover, exposure to high levels of lead can increase risk for adverse health effects long after exposure has ceased. This fact sheet discusses these excess health risks, along with special approaches to consider with patients who were exposed to high levels of lead in the past.

**How does the timing of lead exposure affect my patients' health?**

Current, ongoing lead exposure can elevate lead levels in body tissues and in blood, where it is measured as blood lead level, or BLL, in mg/dL. Acute and chronic lead exposures that raise the BLL can cause well known adverse health effects, and sometimes permanent injury, to numerous body organ systems. These include the nervous system (especially in children), blood, kidneys, reproductive system, and fetuses, among others. These effects are dose-dependent, but even low levels of exposure can have adverse effects. After exposure ceases, BLL returns to normal fairly quickly (half-life about 36 days).

Some effects of lead end as soon as exposure ceases and BLL returns to normal (such as blood enzyme effects). Some effects of high BLL can be permanent (such as some neurological effects, especially in children, or kidney nephrons lost to injury). Some adverse effects are known risks during times of exposure (such as certain reproductive effects on sperm, fertility or pregnancy); but whether these risks remain after the exposure has ceased is not known.

Finally, there are adverse health effects which highly exposed people are at increased risk of developing even many years after lead exposure has ceased, such as high blood pressure and chronic renal failure or end stage renal disease (ESRD). These particular effects can be discovered and treated early for the benefit of the patient. In addition, one neurological outcome, adult Attention Deficit Hyperactivity Disorder or ADHD, is likely to be more prevalent in people exposed to lead in childhood and is treatable even in adults.

**How does lead storage in bone affect my patients' health?**

In addition to the end-organ effects of lead discussed earlier, lead-exposed individuals may be at risk of re-exposure because lead can be stored in bone and then released later. While elevated lead levels in the blood are short lived once exposure ceases, lead can be stored in bone for long periods of time (half-life about 20 years). Therefore, BLL may not reflect total body burden.

Bone-stored lead exchanges slowly with blood under normal circumstances, but can be released more rapidly during times of calcium mobilization, causing re-exposure. When lead is stored in bone, bone turnover at a normal rate will contribute only a few mg/dL to BLL. However, high bone turnover, such as during pregnancy, lactation, menopause (osteoporosis), hyperthyroidism and other physiological states, could potentially increase BLL more significantly. Other at-risk situations include prolonged immobilization and some medications.

Health care providers should consider measuring BLL in their previously lead-exposed patients during times of calcium stress (as listed in the previous paragraph). However, bear in mind that a high BLL could also indicate current exogenous exposure, which should be investigated and stopped, if found.

## **How can the release of bone-stored lead be prevented?**

If patients have lead stored in their bones, it is important to take measures to prevent the release of that lead into the blood and resulting re-exposure. There is good reason to prevent calcium deficiency and excess bone mobilization in previously lead-exposed patients by recommending a calcium-rich diet and/or calcium supplementation. It is good public health practice to recommend bone-protective measures to all patients, but especially to previously lead-exposed patients. There should also be a special emphasis on measures to prevent or treat osteoporosis in menopausal women. This can be accomplished by:

- Ensuring sufficient calcium and vitamin D in the diet (or supplementation, if not contraindicated).
- Getting regular weight-bearing exercise.
- Quitting smoking.
- Preventing or treating osteoporosis with medication such as biophosphonates and calcitonin, as appropriate.

## **What are general recommendations for health care providers treating previously lead-exposed patients?**

- Be aware which of your patients were previously exposed to high lead levels.
- Be vigilant for the health problems discussed in this fact sheet, in order to diagnose and treat them early.
- Special attention should be paid during times of calcium stress.
- All the conditions related to lead exposure are multifactorial in cause. Finding a causal linkage with lead is less important than ensuring proper diagnosis and treatment.
- With rare exception, diagnosis and treatment of conditions in lead-exposed patients is no different than treatment of non-lead-exposed patients.
- Aggressively treat comorbid conditions that can lead to or worsen the health effects of lead exposure. For example, hypertension and diabetes are the most common causes of progressive kidney disease, and they are both responsive to treatment.

## **What should I recommend to my previously lead-exposed patients?**

- Recommend calcium supplementation (or a calcium-rich diet) and other bone protective measures for all lead-exposed patients, unless contraindicated (see section on preventing release of lead from bones).
- Inform and counsel your patients about the importance of controlling their risk factors for diseases associated with lead exposure or for which bone mobilization is a danger (such as hypertension, kidney disease, osteoporosis, etc.). Consider medical control of risk factors where indicated.
- Advise your patients on lifestyle changes they can make to prevent or control health problems for which they may be at higher risk due to past lead exposure.
- Always promote healthy habits, but especially in populations with increased health risks.

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